

# ESA-016 Public Report

**Introduction:** UOP Mobile produces a variety of molecular sieves, absorbents, and catalysts. Steam is a major component in the production process, facilitating the crystallization of the product and other heating requirements.

**Objective of ESA:** To reduce boiler energy use by increasing efficiency and reducing the demand for steam.

**Focus of Assessment:** Assessment focused on operation of three boilers supplying an average 40,000 pounds per hour of 90 psig steam to plant production units. The large boilers are equipped with feedwater economizers and are well tuned, in spite of old jackshaft controls. Because of process needs and contamination concerns, no condensate is currently returned to the boiler. This is being challenged.

**Approach for ESA:** Working with the plant lead an SSAT model was created for the facility using data provided by plant metering. Boiler operating parameters, such as stack oxygen content and temperature were measured, confirming operation of the in-situ metering. Opportunities for savings were modeled using SSAT and basic engineering relations.

## General Observations of Potential Opportunities:

- Indicate total plant natural gas cost for base year, 2005?
  - o About \$10,500,000
- Indicate impact fuel cost in \$/MMBtu, impact electrical cost in cents/kWh if necessary for ESA:
  - o Natural gas cost: \$9.92/MMBTU
  - o Electricity: \$0.0461/kWh
- Note what you would expect would be Near Term, Medium Term, Long Term opportunities. See definitions below:
  - ❑ Near term opportunities would include actions that could be taken as improvements in operating practices, maintenance of equipment or relatively low cost actions or equipment purchases.

**Implement Steam Trap Maintenance Program.** Steam traps are not tested on a regular basis. An outside consultant is currently completing a test of all traps, as part of a project to catalog the trap inventory. Testing was last performed about three years ago. We recommend that trap maintenance be performed annually and the outside contractor also replaces failed traps.

**Insulate Hot Surfaces** In several locations, insulation on steam pipes was missing, or has deteriorated because it got wet or from age. The assessment used 3E Plus to model the heat from the uninsulated end of the mud drum on boiler #1. The insulating blanket piece had been removed sometime ago for maintenance. As a result of the survey, it was located and replaced. Other bare hot surfaces should be identified and insulated.

**Change Boiler Efficiency on Boiler #3** Measurement of flue gases from boiler #3 indicate an elevated excess air level. This indicates that a burner tune-up would be in order.

- ❑ Medium term opportunities would require purchase of additional equipment and/or changes in the system such as addition of recuperative air preheaters and use of energy to substitute current practices of steam use etc. It would be necessary to carryout further engineering and return on investment analysis.

**Install Blowdown Flash to Low Pressure Steam and Modify Low Pressure Condensate Flash System** Recover flash steam and heat from the boiler blowdown to reduce steam needed in the deaerator system.

**Change Condensate Recovery Rates and Use in Hot Water Tanks** Plant personnel determined that it would be expensive to recover the small amount of clean condensate back to the boiler. This condensate should instead be pumped to the hot process water tanks. A project is currently being scoped to recover some of the plant condensate into hot water tanks.

- ❑ Long term opportunities would require testing of new technology and confirmation of performance of these technologies under the plant operating conditions with economic justification to meet the corporate investment criteria.

**Use High Efficiency Direct Contact Water Heater for Hot Water** Use a direct contact, high efficiency water heater to provide hot process water. This will increase the efficiency of generating hot water from about 85% to 99%. Concerns about carbonate concentrations in the water should be addressed before implementation.

- Estimate, if possible, % plant natural gas savings from
  - o a) Near Term opportunities 0.2%
  - o b) Medium Term opportunities, 1.6%
  - o c) Long Term opportunities. 1.9%

**Management Support and Comments:** Management support at the facility is good and the engineering personnel are proactive in proposing energy conservation projects. However, product demand is high and energy conservation projects must compete for funds with production projects.

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